

The role of voluntary green behavior and green performance in promoting sustainability in the hospitality industry



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ABSTRACT

This study aims to explore how green training, green commitment, and green information management affect green performance in 5-star hotels in Medan City, focusing specifically on voluntary green behavior. The study's participants included 331 employees from seven 5-star hotels in Medan City: JW Marriott Hotel, Aryaduta Hotel, Grand Mercure, Cambridge Hotel, Grand City Hall Medan, Hotel Danau Toba International, and Adimulia Hotel. Each of these hotels has been in operation for more than five years. Data was collected through a questionnaire and analyzed using structural equation modeling (SEM). The findings confirm that green training, green commitment, and green knowledge management play important roles in promoting sustainable practices in the hotel industry. Investing in employee training to build knowledge and skills, showing strong management commitment to sustainability, and implementing effective knowledge management are key to creating a work environment that supports sustainability and environmental responsibility. The managerial implications suggest that hotels should focus on developing policies and programs that encourage sustainable practices. This includes improving education and training, strengthening organizational commitment, and adopting effective knowledge management practices. By doing so, hotels can enhance their sustainability performance and strengthen their reputation and competitiveness in an increasingly eco-conscious market.

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1. Introduction

The hotel sector faces a significant risk from global warming (Ali et al., 2024). Nevertheless, stakeholders must unequivocally convert this menace into an occasion to enhance competitiveness (Palmié et al., 2023). By promoting eco-friendly practices and fostering sustainable performance, hotels may effectively attract more tourists (Egemen, 2024). According to Gusmerotti et al. (2023), hotel workers who exhibit environmentally friendly conduct and demonstrate green performance are believed to have the potential to enhance the hotel's branding and competitive advantage.

The primary objective of most manufacturing organizations is to minimize the waste created during the manufacture and disposal of industrial goods, with the goal of enhancing corporate performance (Faris et al., 2024). Organizations that adopt green business practices, including green human resource management, will see increased cost savings that lead to profits (Rosnaida et al., 2024). The green business facilitates the enhancement of company performance, particularly in terms of environmental performance and the establishment of a green corporate culture (Mamun, 2023). To achieve environmental performance, it is crucial for hotels to have the capability to adapt and modify their strategic strategies in response to growing competition and evolving environmental conditions (Aboramadan et al., 2022). Recent empirical research corroborates the assertion that implementing green human resource management techniques positively impacts firm performance (Segbenya et al., 2024). Green human resource management strategies are the optimal approach for

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environmental performance initiatives since they establish a basic framework that allows firms to effectively manage their environmental impact (Filimonau et al., 2023).

The phrase "green employee" pertains to the environmental results that a hotel accomplishes by implementing environmental initiatives with the objective of mitigating adverse environmental impacts (Xiao et al., 2024). Research has shown that employees who actively participate in environmentally friendly activities are more likely to demonstrate higher levels of creativity and innovation when it comes to identifying solutions that minimize negative effects on the environment (Alshahrani and Iqbal, 2024). Employees can suggest innovative concepts, such as the implementation of renewable energy sources, the adoption of environmentally friendly technologies, or the enhancement of waste management methods (Zhang et al., 2024). Green-minded employees have the potential to serve as catalysts for change by promoting environmental awareness among their coworkers and hotel patrons (Liaquat et al., 2024). Employees can inform and instruct others about the significance of sustainable practices and methods to support environmental conservation initiatives (Gupta and Jangra, 2024). Employees can assist hotels in mitigating long-term financial risks related to increasing energy or resource expenses by implementing suitable environmentally friendly procedures (Tirno et al., 2023). This can enhance the hotel's long-term financial viability over an extended period (Prentice et al., 2023).

An issue that hotel sector participants find worrisome is the voluntary adoption of environmentally friendly practices (Liaquat et al., 2024). Voluntary green behavior refers to proactive and voluntary actions taken by workers to support the organization's green goals without any direct pressure or incentives (Liaquat et al., 2023). This behavior includes activities such as conserving energy, minimizing trash, and endorsing environmentally friendly projects within the workplace (Amrutha and Geetha, 2021). The hotel's surrounding environment can be enhanced by the voluntary initiatives of employees in adopting green practices (Tandon et al., 2023). This encompasses the mitigation of air and water pollution, with the advocacy for the use of environmentally friendly products that can minimize detrimental effects on the local ecology (Biswas et al., 2021).

Previous studies have found that engaging in voluntary environmentally friendly actions has a direct and substantial impact on workers who prioritize sustainability (Zhang et al., 2021). Hotels can enhance their ability to withstand the effects of climate change by implementing environmentally friendly measures (Zhu et al., 2021). Hotels can benefit from having employees who are knowledgeable in green practices as they can assist in recognizing and addressing environmental fluctuations that may impact staff operations, such as rising temperatures, alterations in rainfall patterns,

or the potential for natural calamities (Biswas et al., 2021).

Moreover, the significance of green training in the hotel business lies in its ability to enhance the number of environmentally conscious personnel (Yafi et al., 2021). Green training may be defined as a training process that improves employees' understanding and abilities in ecologically sustainable actions (Amrutha and Geetha, 2021). This encompasses instruction on waste management, energy preservation, and further sustainable work methodologies (Azadi et al., 2021). Employees get green training to fully grasp the importance of the environment and incorporate this knowledge into their everyday responsibilities, ultimately improving the organization's environmental performance (Aziza et al., 2023). Employee performance reviews may include the evaluation of green training as a contributing element (Mendesa et al., 2024). Hotels can assess the extent to which their staff contribute to sustainable practices and use this evaluation in their yearly performance evaluations (Sun et al., 2024). This fosters motivation among employees to actively participate in sustainability initiatives and guarantees the integration of environmentally friendly practices into the overall work culture (Barakat et al., 2023).

Prior research suggests that green training has a direct and substantial impact on employees who are environmentally conscious (Das and Dash, 2023). Hotels can accomplish their long-term sustainability goals by employing staff members who have received training in environmentally friendly procedures (Danirmala and Prajogo, 2022). Employees can actively participate in the creation and execution of more extensive sustainable policies. They can also access and communicate the progress made towards achieving these objectives to management and other stakeholders.

Green commitment pertains to the extent of dedication demonstrated by a firm and its employees toward achieving environmental objectives (Noor Faezah et al., 2024). It entails a dedication to minimizing adverse effects on the environment and endorsing environmentally friendly efforts (Haldorai et al., 2022). By prioritizing the adoption of sustainable practices, hotels may effectively minimize their workers' carbon footprint and environmental impact (Hossain et al., 2022). These benefits encompass decreased emissions of greenhouse gases, enhanced water efficiency, and improved waste management (Liu et al., 2022). Employees who actively participate in these activities make a direct contribution to these efforts by establishing environmentally friendly policies and practices in their everyday work (Gonzalez et al., 2022). Hotels that encourage environmentally conscious staff often establish alliances with suppliers and vendors who adhere to sustainable principles (Ren et al., 2023). This entails acquiring ecologically conscious products and services while also advocating for a more enduring and

environmentally responsible supply chain (Sheng and Liu, 2024). The hotel's management staff can ensure the acquisition of exclusively sustainable products and services (Hameed et al., 2022).

Previous study findings indicate that green commitment has a substantial impact on workers who prioritize environmental sustainability (Haldorai et al., 2022). The dedication of environmentally conscious personnel can have a broader influence on the whole hospitality business (Zhang et al., 2023a). Hotels that effectively implement environmentally friendly measures can serve as examples for other hotels, promoting the adoption of sustainable practices throughout the industry (Nasir et al., 2023). This contributes to expediting the shift towards a more environmentally friendly hotel sector on a worldwide scale (Khan et al., 2022). Green knowledge management is widely recognized as a crucial element in promoting the growth of environmentally conscious staff (Cegarra-Navarro et al., 2024). Green knowledge management refers to the management of knowledge related to environmentally sustainable activities inside businesses (Van Vo and Nguyen, 2023). The process includes the generation, retention, dissemination, and utilization of information pertaining to environmental concerns (Jasrotia et al., 2024). Through efficient green knowledge management, companies may guarantee the accessibility and usability of crucial information related to environmental sustainability for all employees. This, in turn, enhances the organization's capacity to achieve superior green performance (Raum et al., 2024). Green knowledge management offers expanded job prospects for individuals interested in pursuing a profession in sustainability or corporate social responsibility (Mohtat and Khirfan, 2023). It establishes a distinct professional trajectory and inspires individuals to enhance their expertise in sustainable management (Khan et al., 2023).

Previous studies have shown that green knowledge management has a direct and substantial impact on green personnel (Kusa et al., 2024). Employees who possess expertise in green knowledge management may significantly contribute to enhancing consumer trust and loyalty toward hotels (Zámborský et al., 2023). Customers are more likely to choose and continue to support firms that show a firm dedication to sustainable practices (Ricciardi et al., 2024).

Medan City boasts a substantial population and serves as the residence for a diverse range of cultural groups. Undoubtedly, this uniqueness makes Medan City a symbol of pride for its residents. Similarly, hotels in Medan City should promote environmentally conscious behavior and green practices, especially among their hospitality workers. This research is highly relevant since the green hotel business is presently a top goal for the country. The government aims to attract more tourists and improve its reputation by supporting global climate change activities. We expect that the results of this research will influence the

understanding and frameworks of voluntary environmentally friendly behavior and environmentally friendly performance, therefore strengthening the green hotel business.

2. Literature review

2.1. Green performance

Green performance pertains to the performance or results associated with environmentally conscious activities, policies, or initiatives inside a business or organization (Din et al., 2024). The entity's beneficial influence on the environment and sustainability is measured by a variety of measures and indicators (Li et al., 2024). Green performance encompasses not only environmental factors but also social and economic factors, which vary depending on the strategy adopted by the company or researcher (Sun and Nasrullah, 2024). Assessing green performance enables firms to gauge their influence on the environment, track advancements in attaining sustainability objectives, and enhance current practices or regulations (German et al., 2023).

Employees who advocate for environmentally friendly practices might contribute to increasing visitor understanding of the significance of sustainability (Jiang et al., 2023). Staff members have the capacity to furnish guests with information on their involvement in sustainability initiatives throughout their stay (Green and Heywood, 2023). Hotels that demonstrate a strong dedication to sustainability and the environment tend to be more appealing to workers who prioritize these concerns (Fosu et al., 2024). This can facilitate the process of attracting and retaining committed personnel who possess comparable values (Tandon et al., 2023). Hotels can enhance their operational efficiency by including workers in sustainability initiatives (Tirno et al., 2023).

2.2. Voluntary green behavior

Individual or group actions are carried out consciously to protect or improve the environment (Khalid et al., 2022). Employees who actively participate in environmentally friendly actions tend to exhibit more motivation and demonstrate a stronger dedication to their firm (Shao et al., 2023). Employees often have a sense of pride when they are employed by a firm that demonstrates concern for the environment (Zeng and Yin, 2024). This can lead to heightened levels of loyalty and motivation in their job. Implementing sustainable practices, such as waste reduction, energy conservation, and the use of eco-friendly products, can result in improved operational efficiency (Younas et al., 2023). Implementing this strategy can lead to a decrease in the hotel's ongoing expenses, a boost in profitability, and an indirect enhancement of staff productivity because of improved financial security and incentives (Barreiro-Hurle et al., 2023). Guests and

the public frequently see hotels that prioritize green initiatives as being more socially and ecologically responsible (de Mello, 2024). Enhancing the hotel's brand image and reputation can lead to a rise in guest numbers and foster brand loyalty (Ren et al., 2023). Employees who see that their contributions extend beyond the company's financial performance are often more content with their work (Biswas et al., 2021). Enhanced work satisfaction can decrease staff turnover and enhance retention, ultimately enhancing the hotel's overall performance (Amrutha and Geetha, 2021). The indicators and dimensions of voluntary green behavior include environmental awareness, pro-environmental attitude, social norms, environmental knowledge, involvement in green practices, attitudes toward consumption, proactive behavior, perception of self-efficacy, personal sacrifice, and acceptance of green technology (Kim et al., 2017).

H1: Voluntary green behavior directly has a significant effect on green employees.

2.3. Green training

Green training encompasses training programs specifically developed to enhance employee understanding and expertise in environmentally sustainable practices and their practical application in their day-to-day professional activities (Aboramadan, 2022). Green training offers staff the chance to comprehend the significance of environmentally friendly measures in hotel operations (Mendesa et al., 2024). They can acquire knowledge on optimizing energy consumption, implementing effective waste management practices, utilizing eco-friendly products, and employing other tactics to minimize the ecological footprint of hotel operations (Alola et al., 2022). Acquiring this information can enhance their consciousness of their social and environmental obligations (Das and Dash, 2023). Through green training, hotel personnel may get practical knowledge on how to implement ecologically sustainable practices in their everyday responsibilities (Sun et al., 2024). For instance, individuals may acquire knowledge on minimizing water and energy usage while cleaning rooms, as well as improving garbage sorting and management in the kitchen or public spaces (Barakat et al., 2023). Implementing green training programs may enhance the overall operational efficiency of a hotel (Sun et al., 2024). Hotels may decrease their long-term running expenses by adopting sustainable measures, such as energy saving and trash reduction (Danirmala and Prajogo, 2022).

H2: Green training directly has a significant effect on voluntary green behavior.

H3: Green training directly has a significant effect on green employees.

H4: Green training indirectly has a significant effect on green employees through voluntary green behavior.

2.4. Green commitment

Green commitment refers to an organization's dedication to adopting ecologically conscious practices and advocating for sustainability (Haldorai et al., 2022). The green commitment of a corporation can impact employee behavior by motivating people to embrace environmentally friendly activities in the workplace (Kitsis and Chen, 2021). Employees are likely to be more motivated to use resources efficiently, minimize waste, and actively support sustainability programs (Ahmed et al., 2023). An employee's level of green commitment is determined by their psychological attachment, their consideration of the organization's aims and values, and their sense of duty towards the environment (Guo et al., 2021). Green commitment refers to an employee's dedication, participation, connection, active involvement, and care for the ecological environment of their company (Hameed et al., 2022).

Workers exhibit a lack of dedication and minimal regard for the environment; hence, it is plausible that they would not prioritize ecological matters in their everyday job activities (Liu et al., 2022). Employee behavior is favorably influenced by individual involvement and compassion (Zhang et al., 2023a). Employee green commitment (Nasir et al., 2022) is linked to environmentally beneficial activities such as energy management, turning off unnecessary lights, recycling, and overall care for ecological concerns in the workplace. Consistent with this, prior studies have verified that having a strong emotional connection to a commitment results in engaging in environmentally friendly actions. Furthermore, when individuals have a higher degree of dedication to environmental causes, they are more likely to engage in environmentally conscious behaviors (Sharma et al., 2021). Hence, the dedication of employees to environmental sustainability results in their adoption of environmentally friendly actions (Al-Swidi et al., 2021).

H5: Green commitment has a direct and significant effect on voluntary green behavior.

H6: Green commitment has a direct and significant impact on green employees.

H7: Green commitment indirectly has a significant effect on green employees through voluntary green behavior.

2.5. Green knowledge management

Green knowledge management refers to a method of gathering, storing, sharing, and utilizing information that specifically emphasizes ecologically sustainable solutions and activities (AlQershi et al., 2023). Sustainability integration refers to the incorporation of information regarding sustainability into an organization's decision-making and operational processes (Hasselsteen et al., 2024). Green knowledge management in an organizational context highlights the significance of comprehending

and employing information regarding environmental concerns and sustainable methodologies (Sahoo et al., 2023). The green knowledge management strategy utilizes information and communication technology to effectively manage, distribute, and update knowledge pertaining to sustainability (Ricciardi et al., 2024). Green knowledge management encompasses tactics for recognizing, comprehending, and using tacit (unwritten) knowledge possessed by individuals inside the company. Green knowledge management enhances companies' comprehension of environmental and sustainability problems and facilitates the creation of inventive and sustainable resolutions (Hasselsteen et al., 2024). Organizations may mitigate their environmental footprint, enhance operational efficiency, and bolster workers' standing as pioneers in sustainable practices by using green knowledge management (Ghorbani, 2023). Green knowledge management promotes collaboration among organizations, governments, and communities to collectively tackle environmental concerns (Polas et al., 2023).

- H8:** Green knowledge management has a direct and significant effect on voluntary green behavior.
- H9:** Green knowledge management has a direct and significant impact on green employees.
- H10:** Green knowledge management indirectly has a significant effect on green employees through voluntary green behavior.

3. Method

This study employs a quantitative approach to investigate the impact of voluntary environmentally

friendly actions on the relationship between green training, green commitment, and green knowledge management, as well as the overall environmental performance of 5-star hotels in Medan City. The target market comprises individuals who are permanent workers with a tenure of over five years in 5-star hotels in Medan City. The target demographic for this study comprises personnel working at 5-star hotels in Medan City, based on the data obtained.

Purposive random sampling, based on Table 1, selected 331 employees with more than 5 years of service for the research sample. We used a questionnaire with a Likert scale to collect data for this study. We prepared the questionnaire based on the indicators of each research variable. Finally, the data analysis in this study used the structural equation modeling (SEM) model.

Table 1: Number of employees at 5-star hotels in Medan City in 2023

No.	Name of the hotel	Number of people
1	JW Marriott Hotel	375
2	Aryaduta Hotel	230
3	Grand Mercure	115
4	Cambridge Hotel	315
5	Grand City Hall Medan	340
6	Hotel Danau Toba International	277
7	Adimulia Hotel	298
	Total	1950

4. Result and discussion

4.1. Construct validity testing

According to Table 2, the questions' validity values for all research variables are declared valid because the overall validity value is more than 0.7.

Table 2: Results of the analysis of cultural disclosure pattern question items

Variable	Statement	Loading factor	Alpha	Information
Green training (X1)	GT.1	0.759	0.7	Valid
	GT.2	0.765	0.7	Valid
	GT.3	0.732	0.7	Valid
	GT.4	0.835	0.7	Valid
	GT.5	0.788	0.7	Valid
	GT.6	0.734	0.7	Valid
Green commitment (X2)	GC.1	0.837	0.7	Valid
	GC.2	0.717	0.7	Valid
	GC.3	0.708	0.7	Valid
	GC.4	0.743	0.7	Valid
	GC.5	0.794	0.7	Valid
	GC.6	0.761	0.7	Valid
Green knowledge management (X3)	GM.1	0.853	0.7	Valid
	GM.2	0.848	0.7	Valid
	GM.3	0.911	0.7	Valid
	GM.4	0.883	0.7	Valid
	GM.5	0.877	0.7	Valid
	GM.6	0.837	0.7	Valid
Green performance (Y)	GR.1	0.867	0.7	Valid
	GR.2	0.890	0.7	Valid
	GR.3	0.856	0.7	Valid
	GR.4	0.766	0.7	Valid
	GR.5	0.771	0.7	Valid
	GR.6	0.817	0.7	Valid
Voluntary green behavior (Z)	VB.1	0.858	0.7	Valid
	VB.2	0.707	0.7	Valid
	VB.3	0.848	0.7	Valid
	VB.4	0.804	0.7	Valid
	VB.5	0.860	0.7	Valid
	VB.6	0.878	0.7	Valid
	VB.7	0.737	0.7	Valid
	VB.8	0.824	0.7	Valid

4.2. Construct reliability test

The data processing findings indicate the following outcomes mentioned in Table 3.

Table 3: Construct reliability test results

Variable	Composite reliability
Green training (X1)	0.811
Green commitment (X2)	0.862
Green knowledge management (X3)	0.949
Green performance (Y)	0.929
Voluntary green behavior (Z)	0.936

According to the provided Table 3, the average value is more than 0.5. Hence, the composite dependability value exceeds 0.7. Thus, it may be inferred that the study's indicators are accurately assessed.

4.3. Coefficient of determination (R²)

Table 4 indicates that the green performance variable has an adjusted R² value of 0.738, which corresponds to 73.8%. The remaining 26.2% is influenced by other factors that were not included in this study. The remaining 33.1% of the adjusted R² value of the voluntary green behavior variable, which is 0.699 or 69.9%, is influenced by the other factors in the research.

Table 4: Results of green performance analysis

Variable	R ²	R ² adjusted
Green performance (Y)	0.749	0.738
Voluntary green behavior (Z)	0.709	0.699

4.4. Predictive relevance (Q²)

The Q² value is equivalent to the coefficient of determination, often known as R². A Q² value of 0 indicates that the model has predictive relevance. Conversely, a Q² value less than 0 indicates that the model has less predictive relevance. In other words, higher Q² values indicate that the model is more suitable for the data. The evaluation of the Q² value can be conducted in the following manner:

$$Q^2 = 1 - (1 - R_1^2) (1 - R_2^2) \dots (1 - R_n^2) = 0.921$$

The Q² value is 0.921, as indicated by these data. Therefore, it can be inferred that all variables in the research provide 92.1% of the authenticity data in the current structural model. Subsequently, the remaining 7.9% need separate development, apart from the research variables.

4.5. Research hypothesis test

Table 5 demonstrates that green training, green commitment, and green knowledge management have a substantial impact on both voluntary green behavior and green personnel, both directly and indirectly. Voluntary green behavior indirectly influences the impact of green training, green commitment, and green knowledge management on green personnel.

5. Discussion

5.1. The influence of green training on green performance

This study discovered a clear correlation between green training and green performance in the 5-star hotels in Medan City, which contributes to the development of a sustainable green hospitality sector. The result indicates a statistically significant value of 0.002, which is below the threshold of 0.05. Additionally, the t-value (3.580) is above the critical t-value (1.98). Moreover, the first sample value is 1,077. The hotel sector uses green training as a method to improve staff knowledge and skills in implementing eco-friendly practices. Green performance encompasses a hotel's environmental practices, such as energy efficiency, waste management, water usage, and other eco-friendly measures. This study aligns with other studies conducted by Isrososiawan et al. (2020), which elucidate that hotels that effectively adopt green training see substantial enhancements in their environmental performance. Additionally, these hotels have decreased operational expenses and heightened visitor contentment.

Table 5: Direct effects of research hypothesis testing

Hypothesis	O	M	STDEV	T-statistic	P-value	Conclusion
Green training (X1) -> Green performance (Y)	1.077	1.061	0.133	3.580	0.002	Significant
Green training (X1) -> Voluntary green behavior (Z)	0.102	0.114	0.159	2.640	0.005	Significant
Green commitment (X2) -> Green performance (Y)	0.267	0.256	0.166	2.607	0.000	Significant
Green commitment (X2) -> Voluntary green behavior (Z)	0.222	0.239	0.194	4.149	0.005	Significant
Green Knowledge Management (X3) -> Green performance (Y)	1.141	1.110	0.179	3.792	0.000	Significant
Green Knowledge Management (X3) -> Voluntary green behavior (Z)	0.595	0.574	0.146	4.071	0.000	Significant
Voluntary green behavior (Z) -> Green performance (Y)	0.568	0.602	0.170	3.334	0.001	Significant
Green training (X1) -> Voluntary green behavior (Z) -> Green performance (Y)	0.558	0.542	0.193	2.620	0.000	Significant
Green commitment (X2) -> Voluntary green behavior (Z) -> Green performance (Y)	0.126	0.148	0.132	3.959	0.000	Significant
Green knowledge management (X3) -> Voluntary green behavior (Z) -> Green performance (Y)	0.338	0.353	0.154	2.132	0.001	Significant

O: Original sample; M: Average; STDEV: Standard deviation

The conclusions of this study suggest that green training enhances employees' understanding of the significance of environmentally sustainable behaviors and their effects on the environment. Enhanced comprehension of the hotel's green

activities is likely to result in increased support from employees. Moreover, this training equips staff with the necessary knowledge and abilities to efficiently adopt environmentally friendly activities. Ultimately, by employing well-trained staff, hotels may

successfully execute environmental initiatives that are both more streamlined and impactful. This includes the implementation of measures such as minimizing energy and water use, improving waste management practices, and utilizing eco-friendly products.

5.2. The influence of green training on voluntary green behavior

This study discovered a clear correlation between green training and voluntary green behavior in the context of supporting the sustainable green hospitality sector at 5-star hotels in Medan City. The obtained result demonstrates a statistically significant value of 0.005, which is below the commonly accepted threshold of 0.05. Additionally, the t-value of 2.640 is above the critical t-value of 1.98. Moreover, the first sample value is 0.102. This study corroborates the conclusions of research conducted by [Alola et al. \(2022\)](#), which emphasize the crucial importance of sustainability and top management support in attaining optimal environmental performance. The hotel sector uses green training to improve staff knowledge and skills in implementing eco-friendly practices ([Sun et al., 2024](#)). Green performance encompasses a hotel's environmental performance, which includes aspects such as energy efficiency, trash management, water usage, and other eco-friendly measures ([Danirmala and Prajogo, 2022](#)). Employees who actively participate in sustainable initiatives and adopt environmentally conscious behaviors at work, regardless of organizational regulations, demonstrate voluntary green behavior ([Das and Dash, 2023](#)).

This study shows that the hotel industry can adopt voluntary green behaviors (VGB) by implementing measures that promote sustainability and protect the environment. Hotels carry out various eco-friendly practices, referred to as VGB, which include reducing energy consumption and managing waste through recycling materials like paper, glass, plastic, and metal. They also minimize the use of disposable plastics, such as straws, water bottles, and utensils. Composting food scraps and other organic waste is another effective strategy. Water conservation is promoted through the use of efficient devices, such as low-flow showerheads and faucets, and advanced landscape watering systems like drip irrigation. Additionally, hotels encourage guests to participate in initiatives such as reusing towels and linens. By adopting these voluntary green practices, hotels can improve their environmental sustainability and attract environmentally-conscious customers.

5.3. The influence of green commitment on green performance

The findings of this study indicate that there is a clear relationship between a hotel's dedication to environmentally friendly practices and its ability to

achieve sustainable outcomes in the green hospitality business. Specifically, this study focuses on 5-star hotels located in Medan City. The result indicates a statistically significant value of 0.000, which is below the threshold of 0.05. Additionally, the t-value (2.607) exceeds the critical t-value (1.98) from the t-table. Moreover, the first sample value was 0.267. The study is supported by research conducted by [Sheng and Liu \(2024\)](#) and [Munir and Ghani \(2024\)](#). This research shows that five-star hotels in Europe that prioritize ecologically friendly practices have improved environmental performance, especially in water and energy management. Green commitment pertains to a company's dedication to adopting and upholding environmentally conscious practices in its operations. This encompasses the dedication of both management and the entire business to upholding the concepts of sustainability and environmental preservation. The active involvement of senior management is essential in establishing explicit and quantifiable environmental policy. This commitment guarantees that the entire business adheres to rules and initiatives to improve its environmental performance. Hotels that prioritize environmental sustainability are more inclined to dedicate the necessary resources (financial, human, and technological) to adopt eco-friendly practices. This includes the allocation of resources towards the implementation of energy-efficient technology, the establishment of efficient waste management systems, and the provision of environmental training programs for personnel.

The findings of this study suggest that hotels may make substantial enhancements in their environmental performance, such as improving energy efficiency, reducing waste, and optimizing resource utilization, by demonstrating a strong commitment to sustainability. Moreover, hotels that exhibit a robust dedication to the environment might get a competitive edge by appealing to eco-conscious visitors and bolstering their standing as frontrunners in sustainable operations. The green commitment of five-star hotels enhances the sustainable green hospitality sector by showcasing the smooth incorporation of sustainability into hotel operations while maintaining high service quality.

5.4. The influence of green commitment on voluntary green behavior

This study found that green commitment directly affects voluntary green behavior in supporting the sustainable green hospitality industry in 5-star hotels in Medan City. This result shows a significant value of 0.005, which is smaller than 0.05, and the t-value is greater than the t-table (4.149 > 1.98). Furthermore, the original sample value was 0.222. The results of this study are consistent with those of the previous studies ([Xiao et al., 2020](#); [Zhang et al., 2021](#)), which found that green commitment has a significant positive effect on voluntary green behavior among five-star hotel employees.

Implementing the right strategy can support the achievement of sustainability goals and create a wider positive impact on the environment and society. A strong commitment from top management creates a positive example for employees. When company leaders show dedication to environmentally friendly practices, employees are more motivated to follow in their footsteps and engage in green behavior voluntarily.

Embracing a green commitment fosters a business culture that places a high importance on sustainability. Within this context, employees have a sense of backing and motivation to independently engage in environmentally friendly behaviors. Companies, driven by their dedication to environmentally friendly operations, typically offer education and training programs that enhance employee awareness and understanding of the significance of sustainability. This information motivates employees to engage in voluntary actions that align with the company's environmental objectives. Environmentally conscious companies frequently implement reward and recognition initiatives to acknowledge workers who actively engage in voluntary environmentally friendly actions. This acknowledgment has the potential to inspire other employees to participate in comparable endeavors.

The implications of this study suggest that hotels should establish a corporate culture that places a high value on sustainability since it is of utmost importance. To achieve this, implementing effective communication, education, and rewards for employees who voluntarily engage in green behavior is crucial. Introducing an incentivization scheme for employees who exhibit voluntary environmentally friendly actions can inspire other employees to emulate their behavior, resulting in the establishment of a more sustainable work environment. Furthermore, it is important for organizations to furnish facilities and resources that facilitate personnel in undertaking environmentally friendly tasks. This includes the implementation of recycling bins, energy-saving programs, and several other activities that promote environmentally friendly actions.

5.5. The influence of green knowledge management on green performance

This study found that green knowledge management directly affects green performance in supporting the sustainable green hospitality industry in 5-star hotels in Medan City. This result shows a significant value of 0.000, which is smaller than 0.05, and the t-value is greater than the t-table (3.792 > 1.98). Furthermore, the original sample value is 1,141. Research results (Khan et al., 2024; Cegarra-Navarro et al., 2024) through the implementation of green knowledge management, 5-star hotels can achieve better environmental performance, support sustainable hospitality practices, and meet the expectations of guests who

are increasingly aware of environmental issues. Green Knowledge Management (GKM) is knowledge management that focuses on environmentally friendly and sustainable practices. In the hospitality industry, especially in 5-star hotels, GKM plays an important role in improving green performance, namely the hotel's environmental performance in terms of efficient use of resources, waste reduction, and carbon footprint reduction. Through GKM, hotels can implement best practices in energy and resource use. For example, the implementation of energy-efficient technologies and water management strategies can reduce operational costs and environmental impacts. The hotel can integrate knowledge of effective waste management techniques and recycling strategies into its daily operations. This reduces the waste sent to landfills and promotes the reuse of materials. The study highlights the need to create policies and procedures to support the implementation of GKM in hotel operations. This involves developing guidelines and SOPs for green practices. Hotels should also invest in continuous staff training and green technologies to ensure effective and sustainable practices.

5.6. The influence of green knowledge management on voluntary green behavior

This study found that green knowledge management directly affects voluntary green behavior in supporting the sustainable green hospitality industry in 5-star hotels in Medan City. This result shows a significant value of 0.000, which is smaller than 0.05, and the t-value is greater than the t-table (4.071 > 1.98). Furthermore, the original sample value was 0.595. The results of this study are supported by Zhang et al. (2023b), Yang and Li (2023), and Zafar et al. (2023), who explain that green knowledge management plays an important role in encouraging voluntary green behavior among employees in 5-star hotels. Effective implementation of GKM can increase employee awareness and knowledge, motivate their participation in green practices, and strengthen their commitment to the organization's sustainability goals. The implications of this are very significant for the sustainability of the hospitality industry, including more efficient operations, a better reputation, and compliance with applicable environmental regulations.

Implications of this study Increasing voluntary green behavior leads to more efficient and environmentally friendly hotel operations, such as reduced energy and water use and better waste management. Hotels that implement GKM and encourage voluntary green behavior can improve their image and reputation as environmentally responsible companies, which attracts environmentally conscious guests. With consistent green practices, hotels can reduce operational costs and improve long-term sustainability. Green knowledge management (GKM) is the process of collecting, sharing, and utilizing knowledge related to environmentally friendly practices within an

organization. In the context of the hospitality industry, the implementation of GKM plays an important role in encouraging voluntary green behavior (VGB) among employees, which can support hotel sustainability.

5.7. The influence of voluntary green behavior on green performance

This study found that voluntary green behavior directly affects green performance in supporting the sustainable green hospitality industry in 5-star hotels in Medan City. This result shows a significant value of 0.001, which is smaller than 0.05, and the t-value is greater than the t-table ($3.334 > 1.98$). Furthermore, the original sample value was 0.568. Voluntary green behavior not only improves operational efficiency and environmental management but also strengthens the hotel's image and reputation. Therefore, 5-star hotels that want to achieve long-term sustainability must prioritize the development of voluntary green behavior among their employees, which will ultimately support a sustainable green hospitality industry. This study is supported by findings from Zafar et al. (2023) and Siburian and Sugiarto (2022), which demonstrate that employee engagement in voluntary green behavior significantly enhances energy efficiency and waste management in five-star hotels in China. Employees who engage in voluntary green behavior tend to be more aware and act more economically in the use of energy and water, thereby increasing the efficiency of hotel operations. In addition, voluntary green behavior encourages more effective waste management and reduction, reducing operational costs and environmental impacts. Hotels with employees who are active in voluntary green behavior tend to have a better environmental image, attracting environmentally conscious guests. Employees who engage in voluntary green behavior often provide innovative ideas for continuous improvement in hotel operations.

5.8. The influence of green training on green performance through voluntary green behavior

This study discovered that green training has an indirect impact on green performance by influencing voluntary green behavior in support of the sustainable green hospitality sector in 5-star hotels in Medan City. The result indicates a statistically significant value of 0.000, which is below the threshold of 0.05. Additionally, the t-value (2.620) exceeds the critical t-value (1.98) from the t-table. Moreover, the first sample value is 0.558. The implementation of green training plays a vital role in enhancing the voluntary adoption of environmentally friendly practices by personnel in the hospitality sector. By promoting more participation in environmentally friendly actions, the implementation of comprehensive environmental training programs may greatly enhance the ecological performance of luxury hotels with a 5-star

rating. This, in turn, leads to advantages such as improved operational effectiveness, enhanced corporate reputation, and adherence to environmental laws and regulations. Hence, it is crucial for hotels aspiring to actively contribute to the sustainable green hospitality sector to prioritize the adoption of sustainable and well-organized green training programs.

Significance of this research Investing in green training may enhance staff knowledge and skills, which are crucial for promoting voluntary green behavior. Proficient staff are more inclined to actively embrace and execute sustainable initiatives, hence enhancing the hotel's ecological performance. Training that prioritizes green innovation and technology might yield more efficient solutions for tackling environmental concerns and enhancing operational efficiency. Companies may enhance their capacity to achieve long-term sustainability goals and fulfill the demands of environmentally conscious consumers by implementing green training programs to promote voluntary environmentally friendly behavior (Rubel et al., 2021; Algarni et al., 2022).

5.9. The influence of green commitment on green performance through voluntary green behavior

This study discovered that the level of dedication to environmental sustainability has an indirect impact on the performance of sustainable practices in the 5-star hotels in Medan City. This impact is mediated by the voluntary adoption of environmentally friendly behaviors. The result indicates a statistically significant value of 0.000, which is below the threshold of 0.05. Additionally, the t-value (3.959) is above the critical t-value (1.98). Moreover, the first sample value was 0.126. Green commitment is crucial in promoting voluntary green behavior among hotel employees. Through the promotion of sustainable practices and the establishment of a conducive atmosphere, a strong dedication to sustainability may significantly enhance the ecological performance of luxury hotels with a 5-star rating. The study conducted by Haldorai et al. (2022) in South Korea revealed that allocating resources towards green technologies and demonstrating a steadfast dedication to sustainable practices resulted in noteworthy enhancements to hotel gross profit. Research conducted by Sharma et al. (2021) and Ahmed et al. (2023) indicated that transparency in reporting environmental performance and a strong commitment to sustainability have a beneficial impact on voluntary green behavior and green performance within Spain's hotel industry. The study's findings indicate that hotel management should prioritize the adoption of sustainable practices. Embracing sustainability may serve as a blueprint for employees to willingly adopt environmentally friendly practices. Establishing an organizational culture that fosters and endorses sustainable practices with unwavering dedication may enhance

overall value generation and growth potential. Adhering to sustainability practices may enhance the company's reputation in terms of social and environmental accountability while also guaranteeing adherence to progressively rigorous requirements.

5.10. The influence of green knowledge management on green performance through voluntary green behavior

This study found that implementing green knowledge management indirectly impacts green performance by encouraging voluntary green behavior. This finding contributes to the development of a sustainable green hospitality sector in 5-star hotels in Medan City. The results indicate a statistically significant value of 0.001, which is below the 0.05 threshold, and a t-value of 2.132, which exceeds the critical t-value of 1.98. The first sample value was 0.041. Green knowledge management plays a vital role in enhancing the environmental performance of luxury hotels by encouraging voluntary eco-friendly actions among employees. By properly utilizing green expertise, hotels can promote environmental awareness, foster sustainable behavior, and achieve lasting sustainability goals. Therefore, hotel management should prioritize investment in structured and sustainable green knowledge management to actively support the growth of a sustainable green hospitality sector.

This study is supported by research from [Khan et al. \(2024\)](#) and [Cheng et al. \(2023\)](#), which shows that developing green skills through green knowledge management significantly improves green performance and strengthens organizational commitment to sustainability. The findings suggest that adopting green knowledge management can increase employees' understanding of the importance of green practices and equip them with the skills needed to incorporate these practices into their daily activities. Enhanced engagement in voluntary eco-friendly actions, facilitated by effective management of environmental knowledge, can improve hotel performance in areas such as energy conservation, waste management, and regulatory compliance.

6. Conclusion

This study emphasizes the importance of green training, green commitment, and green knowledge management in enhancing green performance in 5-star hotels in Medan City through voluntary green behavior. The analysis findings show that:

1. Green training plays a significant role in boosting voluntary environmentally friendly behavior and performance. It improves employees' knowledge and skills related to green practices and encourages active participation in sustainability initiatives.

2. Hotel management's commitment to environmental sustainability positively impacts the voluntary adoption of eco-friendly practices and overall environmental performance. Strong management dedication to sustainability efforts motivates employees to adopt environmentally conscious behaviors.
3. Green knowledge management is essential for improving access to information and expertise on sustainability measures. Efficient management of information strengthens employees' understanding and commitment to green practices.

Recommendations based on the study's findings to enhance sustainability in 5-star hotels in Medan City include:

1. Providing additional resources for continuous training programs for all staff, including management and operational personnel, to deepen their understanding and effective implementation of sustainable practices.
2. Strengthening staff commitment to sustainability efforts by setting clear goals and integrating sustainable practices into the hotel's business and operational strategies.
3. Implementing a comprehensive knowledge management system to ensure that all employees have easy access to and can effectively use information on sustainable practices.
4. Creating a supportive work environment that encourages and motivates employees to participate in sustainability initiatives, with recognition and rewards for their efforts in eco-friendly activities.
5. Increasing guest awareness of the hotel's sustainability measures to enable active visitor engagement in the hotel's green initiatives during their stay.

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Compliance with ethical standards

Ethical considerations

Ethical approval was obtained, and informed consent was secured from all participants, with data

handled confidentially in accordance with research guidelines.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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